SOLAR AMERICA INITIATIVE

Technical Improvement Opportunities

A1 Breakout Session Report-Out

Solar America Initiative
Technical Exchange Meeting
April 17, 2006

Guiding Questions

Can you design target systems and formulate an R&D project plan within the TIO systems engineering framework?

How well does the TIO structure fit your approach to the PV value chain?

What issues do you anticipate in DOE's use of SAM as a tool to aid project evaluation?

How well does *LCOE as a metric* fit your approach to the PV value chain?

- Have a standard financial assumption for everyone; otherwise, the results could be manipulated. Lifetime is another issue that needs to be understood.
- “Other” costs area still needs to be defined.
- The goals are modest for this initiative.
- SAM needs to include CPV components like trackers and optics.
- SAM seems to be made for thick silicon and should be compatible with innovative device designs.
- Concern arose about need for complete vertical integration. This is not a template most appropriate for a company’s product development. For example, a company developing a module typically hasn’t been working with an inverter developer.
- Appears TIO structure is supporting very conservative approaches and may be stifling innovation. **A group vote was 3 to 2 that this contention is true.** Some think this worked pretty well.

- SAI isn't dealing with market and finance barriers that can be bigger than technology barriers.
- Dissenting voice thought this isn't preventing innovation and cited systems work needed to get 35% solar cells into systems. Applauded DOE for systems opportunity.
- Would like to have more guidance on partnering. Will take lots of resources to team; need facilitation for teaming. Teaming is not usually part of business.
- DARPA has web pages to facilitate teaming to identify possible team members with their capabilities and interests.
- Concern from one component supplier about proposing on many proposals since there are only one or two III-V solar cell suppliers.
- Concern about an innovation that uses module heat and increases efficiency. Would like it to be considered and SAM should be able to evaluate it.
- Can stand-alone be proposed? This could be an important market.

- Cost information will be needed to evaluate through LCOE and SAM. There is a difference between price (for sale) and cost (manufacturing costs). Price may not and likely wouldn't change. May not be able to get confidential cost information to evaluate, especially for LCOE.
- Storage doesn't seem to appear in SAM. Why not?
- These LCOE should be associated with no storage (or with storage). Need to be clear in how storage value is identified.
- Need to be sure that near-term solutions aren't overlooked in desire to meet long-term 2015 goals.
- These numbers and projections need to be put in the context of the much larger PV activities in the rest of the world.

- When the cheapest manufacturing is likely to take place in China (for example) will this be ruled out? Can cheap solar cells be bought elsewhere?
- Need to come up with an approach that allows plant design in US although scale-up might be elsewhere.
- Make or buy decisions can be crucial to this and that may be good.
- Costs are dependent on volume and real costs are likely to be high. Further, with more expenditures in second year, won't see the fruits of expenditures in later years.
- Don't want too many specifics required, but do need a benchmark.
- Might consider large number (500) and then weed them down.

- Recommend use of three system examples in the FOA as benchmark. Graphs and tables (Residential System Requirements) in multiyear program plan. **Don't stifle innovation in FOA.** Use them as examples but not as targets. Note in FOA that this is just a representative sample of numbers. Want to allow low efficiency with low cost.
- SAM does appear to be suitable for team members to provide cost input. Concern about level of detail to assure uniformity in inputs. FOA should specify detail and assumptions needed. What if one proposal includes profit margin and other doesn't. Cost of goods sold plus labor is one level and may be sufficient. What about engineering R&D? What about profit? Need to specify if it's included or not. Margins? Equipment depreciation? **Using accounting to measure progress, and there will be lots of problems in how the accounting is done.**
- Technology Pathway Partnerships will allow for intensification and system optimization. How will that be evaluated? Also, concern about proposal and report information being available publicly or even available within the same team in case of parallel integration.

TIO Construct / SAM

- This construct seems a bit stifling in that it identifies TIOs but puts too much emphasis on accurate projections. No one can predict the future. Three years is about the right length of time to measure progress. This is a step in the right direction. Need the capability to add a new element, new player, new owner, etc, even in the second year. **Definitely need freedom to modify and change throughout the award to adapt to realities and opportunities.**
- Need to include ability in SAM to incorporate BIPS cost savings.
- If you want to include storage, SAM needs to be able to calculate storage costs and impact on LCOE. Make it clear in the FOA so proposer doesn't guess if storage is desirable or not. The market doesn't involve storage and this shouldn't include it, as it isn't needed by industry.

Summation and Review

- Is TIO structure confining? No unanimous agreement but TIOs should allow for modification of TIO structure by applicants.
- Vertical integration may also stifle integration. More time needed to build teams.
- Won't be able to get manufacturing costs. Shouldn't ask for manufacturing costs. Should only ask for price. Manufacturing cost are proprietary and shouldn't be turned over to government. But market pull can be artificial due to subsidies. Consider using LCOE.
- Financial and cost assumptions, including "other" costs should be defined.
- Technology Pathway Partnerships should allow for intensification and system optimization but teaming make take more time than benefits would justify.
- Reporting issues, especially sensitivity around reports, needs to be recognized by DOE.

Summation and Review

- Forecasting is an issue for business communities and need to be very careful.
- Like three year phasing but need to include flexibility to change teams and members and technologies.
- If teaming is done, DOE should help.
- A lot of energy spent on discussion of teaming problems, including time needed, IP, and confidentiality.
- Want to be open to non-conventional, like PV-thermal and stand-alone. Want to be able to capture value of any innovations.
- Be clear in FOA (white paper down select) to not encourage people to hunt wild geese.

Comments on TIO Structure

- Some felt the TIO structure was too confining.
- Should allow for modification of TIO structure by applicants.
- Should use reference system as guideline, not as targets

SAM Comments

- Solar Advisor Model could be too constraining
- Need to be able to incorporate BIPV
- If storage is important, model should treat it.
- Financial and cost assumptions should be clear
- “Other” costs should be specified

LCOE Comments

- LCOE could be used for measuring progress
- Avoid using manufacturing cost data; use price
- LCOE as a target should be normalized to some assumed production volume
- LCOE for conventional energy sources needs to be considered as program progresses.